

Question 1/9 – Transmission and delivery control of television and sound programme signal for contribution, primary distribution and secondary distribution

(Continuation of Question 1/9)

1 Motivation

ITU-T and ITU-R are studying the standards to be used for digital television and sound programme signals transmission.

Television distribution operators such as cable television operators, video distributors and broadcasters normally receive several programme signals from different local or remote sources, and they switch the appropriate signal at the specified time to accommodate local advertisements, local programming, emergency messages, etc.

Bit-rate reduction processing of such digital signals is widely used both in studio installations and for direct broadcasting from terrestrial or satellite transmitters as well as for transmission, including transmission for contribution and for primary and secondary distribution, defined as:

- Contribution: Carriage of signals to production centres where post-production processing may take place;
- Primary distribution: Use of a transmission channel for transferring audio and/or video information to one or several destination points without a view to further post-processing on reception (e.g. from a continuity studio to a transmitter network);
- Secondary distribution: Use of a transmission channel for distribution of programmes to viewers at large (by over-the-air broadcasting or by cable television, including retransmission, such as by broadcast repeaters, by satellite master antenna television (SMATV) and by community based-network, e.g., community antenna television (CATV).

NOTE 1 – Both "community antenna television" and "cable television" are commonly identified by CATV.

It is also important to study the operating requirements for programme delivery controls such as multiplexing, switching and insertion of compressed programme bit streams into different programme streams at content distribution functions such as cable television head-ends. Cost effective and operationally efficient solutions should be found to meet those requirements.

To facilitate the international exchange of programmes and to rationalize the design of equipment, it is desirable to continue to study the methods used for digital source coding of such signals, as defined by other standardization bodies such as Study Group 16.

Indeed, the challenge is to find a balanced compromise among the various factors that interplay in the specification of the transmission method to be preferred for each application. For instance, a compromise must be found among:

- required availability of the service;
- required quality of the picture and sound delivered to the user;
- total latency of the signal in the transmission chain;
- recommended bit-rate reduction method and profile;
- bit rate needed in the channel to deliver the service.

Delivery controls such as multiplexing, switching and/or insertion should satisfy the following requirements:

- would not cause disruptive disturbances to home decoders.

In addition, these solutions would satisfy the above requirements even when the various bit streams:

- are not synchronized to each other;
- use different bit rates and resolutions;
- conform to different picture formats and profiles;

- conform to different compression standards;
- are encapsulated in TS, MMT or other stream formats;
- are conveyed over various types of networks after multiplexing (only applies to MMT).

The studies cover not only television and sound programme signals but also the service delivery of emerging advanced video systems such as UHDTV, HDR, 3D, multi-view and free-viewpoint video over a variety of transport means, including IP-based ones.

NOTE 2 – Measurement and control of quality of service is covered by Study Group 12.

2 Question

Study items to be considered include, but are not limited to:

- Which source coding methods and which interfaces can be recommended for the transmission of digital television and sound programme signals for purposes of contribution over digital transmission circuits and chains?
- Which solutions, from those studied by ITU-R Study Group 6, should be recommended for point-to-point contribution transmission of UHDTV and HDR programme material over physical connections?
- What are the appropriate multiplexing arrangements (component, service, higher level protocols) for the applications above?
- What are the service availability requirements and how do they translate into methods of protection against digital transmission errors for those applications?
- Which requirements must be imposed on the various parameters that interplay to determine the performance of the transmission service, such as QoS, picture and sound quality, signal latency, etc., in order to ensure that the transmission service provides adequate performance for those applications using a reasonable amount of resources, such as a reasonable amount of bit-rate?
- What are the requirements and interfaces to interconnect with the outside entities providing content and/or services to the video and sound transmission networks?
- What are the requirements and interfaces for the video and sound transmission networks to interconnect with other outside networks for video and sound distribution not under the responsibility of ITU-T SG9, e.g., vehicle multimedia networks?
- What are the functional and operational requirements of the various applications that must be met for delivery control of different compressed programme bit streams and/or packet streams, i.e., TS or MMT, on the output channel of television distribution systems such as multiplexing, switching, and insertion?
- Which technical solutions can be recommended to allow the delivery control, such as multiplexing, switching and insertion, of different compressed programme bit streams and/or packet streams, i.e., TS or MMT, on the output channel of television distribution systems?
- What are the appropriate system model, requirements and transmission methods for UHDTV, HDR, 3D (stereoscopic/autostereoscopic/hologram), multi-view and free-viewpoint video signals using different transport means?
- What enhancements to existing Recommendations are required to provide energy savings directly or indirectly in information and communication technologies (ICTs) or in other industries? What enhancements to developing or new Recommendations are required to provide such energy savings?
- What is an appropriate way to convey large volume UHDTV and HDR signal from field to broadcaster station?
- What mechanism is required for physical layer to enable IP-multicast for large volume data such as UHDTV and HDR signal?

3 Tasks

Tasks include, but are not limited to:

- Preparation of a number of new draft Recommendations by the year 2024, which will specify the methods to be used for the transmission and delivery controls of advanced video programmes for purposes of contribution and of primary distribution, and over the digital cable television infrastructure including community based-network, depending on the contributions received, and on progress in the work of the appointed Rapporteur(s).

An up-to-date status of work under this Question is contained in the Study Group 9 work programme (https://www.itu.int/ITU-T/workprog/wp_search.aspx?sp=17&sg=9).

4 Relationships

Recommendations

- ITU-T H.261, H.262, H.263, H.264, H.265
- ITU-T H.222.0
- ITU-T J-series (e.g. J.83, J.181, J.183, J.189, J.195-J.196, J.216, J.222-J.225, J.280, J.288, J.380-series, J.382, J.383, J.225, J.481, J.482)
- ITU-T J Suppl.10
- ITU-R BT.1769, BT.1121-1, BT.1548-2

Questions

- 4/9, 7/9 and 9/9

Study groups

- ITU-T SG12 (especially Q19/12)
- ITU-T SG16 (especially Q6/16)
- ITU-R SGs 4, 5 and 6

Standardization bodies

- AES
- CableLabs
- DVB
- ETSI TC Cable
- IEC TC100
- IEEE
- ISO/IEC JTC1/SC29
- Japan Cable Laboratories
- JCTEA
- SCTE
- SMPTE

WSIS action lines

- C2, C3, C5, C6, C9, C11

SDGs

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